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MUTUAL EFFECT OF ORGANIC AND INORGANIC FERTILIZERS ON PRODUCTIVITY AND ECONOMIC EVALUATION OF BREAD WHEAT

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ABSTRACT

A field experiment was carried out at Kafr El-Hamam, Agricultural Research Station farm, Sharkia Governorate, Egypt, at lat. 30.35, long 31.30 and 13.00 m above the mean sea level during the two winter seasons, 2010/2011 and 2011/2012 to study the effect of different rates of inorganic NPK fertilizers i.e. 25, 50 and 75 % from the recommended dose (75, 15 and 24 kg N, P_2O_5 and K_2O /fed., respectively) alone and/or companied with compost at the rate of 2 ton / fed., and/or humic acid at 6 kg /fed, as a soil application on bread wheat productivity, chemical composition and economic evaluation. Results can be summarized as follows: Generally, in most cases, application of compost with 75 % from the recommendation dose of inorganic NPK fertilizers achieved significant increases in yield and its components as well as chemical composition of wheat plant. The addition of inorganic NPK fertilizers at the recommended rate alone led to the highest significant increases in all yield components and yield as well as macronutrient content of grain, straw and biological yield. Protein percentage was higher by using inorganic NPK fertilizers at the recommendation rate and /or application of compost with 75 % from recommendation dose of inorganic NPK fertilizers. Meanwhile, application of humic acid individually or companied with 25 and 50% from recommended dose of NPK fertilizer gave significant decrease in all parameters in this study. By Calculating the net return of wheat per Feddan, the highest net return is achieved by using the treatment 100% recommended dose (RD), which estimated about 6214 LE in the first season, 5549 LE in the second season. Using humic acid alone achieved the lowest net return about 3616 and 3443 LE in the first and second season, respectively.

INTRODUCTION

Wheat (Tritium aestivum L.) is one of the most imperative staple food crops among cereals, not only in Egypt but also in many other world countries. Wheat grain is consumed in several ways in a number of industrial and commercial products. Wheat is one of the first grains domesticated by human and it is known to have been grown in the Nile Valley by 5000 BC and it is believed that the Fertile Crescent was the centre of domestication. Common wheat plant is the world`s most widely adapted crop and providing one-third of the world population with more than half of their calories and virtually half of their protein necessity. It is mainly grown on rainfed land and about 37% of the area of developing countries consists of semiarid environments in which available moisture constitutes a primary constraint on wheat production.

The use of mineral fertilizers has been increased worldwide for cereal production (Abril *et al.* 2007) due to availability of inexpensive fertilizers (Graham and Vance, 2000). The continued use of chemical fertilizers causes health and environmental risks such as ground and surface water contamination by nitrate leaching (Pimentel, 1996). So, decreasing the amount of fertilizers applied to the field without any deficiency from NPK fertilizers will be the main challenge in field management. Shehata, *et al.*, (2012) found that there was increasing concern about human health and environmental pollution hazards associated with the extensive use of synthesis fertilizer in vegetables production. Compost and growth stimulate agents could be a suitable alternative to chemical fertilizers. Economic premium for certified organic grains have been driving many transition decisions related to the organic farming (Delate and Camberdella, 2004). Continuous use of fertilizers potential contaminates the environment (Oad *et al.*, 2004). Synthesis fertilizers consume a large amount of energy and money. However, the integration of organic sources and synthetic sources of nutrients not only supply necessary nutrients but also have some positive interactions leading to enhance efficiency and thereby, decrease environmental risks (Ahmad *et al.*, 1996). For organic production to be competitive, it has to meet certain quality standards. Unfortunately, organic farmers find it difficult to meet the quality standards for wheat, although they are paid a much higher price for organically produced grain (Ceseviciene *et al.*, 2009).

Organic farming is a production system, which avoids or largely excludes the use of synthetic or inorganic fertilizers, pesticides and growth regulators (Reddy *et al.* 2005). One of the possible options to decrease using of chemical fertilizer could be recycling of organic wastes. Compost as the organic waste can be a helpful and inexpensive fertilizer and source of plant nutrients. Optimistic effects of organic waste on soil structure, aggregate stability and water-holding capacity were reported in several studies (Jedidi *et al.* 2004; Odlare *et al.* 2008). In addition, compost has a high nutritional value, with high concentrations of especially N, P and K, while the contamination by heavy metals and other toxic substances are very low (Asghar *et al.* 2006). Compost can be beneficial to improve organic matter status. Compost is rich source of nutrients with high organic matter content. Physical and chemical properties of soil can be improved by adding compost fertilizer, which may ultimately increase crop yields. Consequently use of compost is the need of the time. Physical properties like bulk density, porosity, void ratio, water permeability and hydraulic conductivity were significantly improved when FYM (10 t ha^{-1}) was applied in combination with chemical amendments, resulting in enhanced rice and wheat yields (Hussain *et al.* 2001).

Humic substances is composed of chemically complex, non-biochemical organic components, which are largely hydrophilic, amorphous, dark colored, powder, or liquid and resistant to chemical and biological degradation (Mackowiak *et al.*, 2001; Adani *et al.*, 2006). Experiments conducted on various crops have shown that HA increases plant growth both directly and indirectly and they have yield increasive effect at different values in many crops (Ulukan, 2007). These substances can either have a direct effect absorption of the humic compounds by the plant, membrane permeability, affecting certain enzymatic activities, etc. (Pinton *et al.*, 1992) or an indirect (changes in the soil structure, improved cationic exchange capacity, motivation of microbiological activity, the capacity to solubilize or complex certain soil ions) effect on the crop production (Cimrin and Yilmaz, 2005).

Therefore, the present investigation aimed to study the effect of compost, humic acid as a soil application and inorganic NPK fertilizers to improve the quantity and quality of wheat plant (Triticum aestivum L), as well as economic evaluation of wheat productivity under a clay soil conditions.

The specific objectives were to study the effect of compost, humic acid with different rates from the recommended dose of inorganic fertilizers on bread wheat productivity, some yield components as well as nutrients contents of wheat grain and straw grown in clay soils.

MATERIALS AND METHODS

The present study was carried out at Kafr El-Hamam, Agricultural Research Station farm, Sharkia Governorate, Egypt, during the two winter seasons, 2010/2011 and 2011/2012 to study the influence of compost, humic acid and inorganic fertilizers rate on wheat plant (Triticum aestivumL.), under clay soil conditions. The experimental site is located at lat. 30.35, long 31.30 and 13.00 m above the mean sea level. Soil of the experimental field was sampled to determine particle size distribution and chemical analyses before planting according to the standard methods (Ryan *et al.*, 1996) and the results are presented in Table (1)

Grains of wheat (cultivar Sahka 94) were sown at the rate of 60 kg /fed., on November, 15$^{\underline{th}}$ and 20$^{\underline{th}}$ in the first and second seasons, respectively. The area of each plot was 10.5m^2.

Table 1: some physical and chemical properties of the studied soils

Particle size distribution		**Season**	
		2010/2011	**2011/2012**
Sand	%	14.00	17.50
Silt		36.40	37.10
Clay		49.60	45.40
Soil texture		Clay	Clay
Chemical analysis			
pH soil: water susp., 1:2.5		7.9	8.3
EC, dSm-1 soil: water ext., 1:2.5		2.5	2.2
S.P	%	60	62
$CaCO_3$		2.4	2.6
OM		1.35	1.37
Ca^{++}	Meq/L	7.1	7.3
Mg^{++}		5.2	6.1
K^{++}		3.2	2.4
Na^{++}		8.4	6.1
CO_3^{--}		0.0	0.0
HCO_3^{-}		4.3	4.1
Cl^{-}		8.6	9.8
SO_4^{--}		11.0	8.0
N	Available (ppm)	35.4	36.2
P		7.2	8.1
K		340	335

Compost was added at the rates of 2 ton /fed., while, humic acid was applied at the rate of 6 kg/fed., both compost and humic acid were added with preparation of soil.

Table 2: properties of the studied compost

pH: In suspension. 1:10	EC dS/m Compost peste	meq.100g $^{-1}$								Organic matter %	C:N ratio	$CaCO_3$	S. p.	Available mg. kg^{-1}		
		Ca^{2+}	Mg^{2+}	Na^+	K^+	$CO_3^=$	HCO_3^-	CL^-	$SO_4^=$			%		N	P	K
6.85	3.7	9.9	7.7	11.25	8.0	0.0	2.74	19.6	14.51	33.93	16.4	3.31	74.67	122	22.23	652

Nitrogen fertilizer as ammonium nitrate (33.5 % N), phosphate fertilizer as calcium superphosphate (15.0% P_2O_5) and potassium in the form of potassium sulphate (48% K_2O) were applied at four rates. The recommended dose of mineral fertilizers (NPK) were 75.0 kg N, 15.0 kg P_2O_5 and 24 kg K_2O /fed., respectively. The fertilizers were applied in two portions, i.e., before first and second irrigation.

The experimental plots were statistically arranged in a randomized complete block design, the treatments were as follows:

1- 100% from recommended dose (RD).
2- Compost (C)
3- Compost +75% (R.D)
4- Compost +50% (R.D)
5- Compost +25%(R.D)
6- Humic Acid (HA)
7- Humic Acid +75%(R.D)
8- Humic Acid +50%(R.D)
9- Humic Acid +25%(R.D)

All cultural practices were carried out according to usual methods being adopted for such crop.

Data of the following characters were estimated: - Plant height (cm), No of grains /spike, grain weight / spike (g), and 1000 grain weight (g). Plants of each plot were harvested, air dried, weighed to determine grain, straw and biological yields.

Plant samples of grain and straw were digested to determine N, P and K. Nitrogen was determined using micro Kjeldahl ,while phosphorous was determined colourimetrically using ammonium molybdate and ammonium metavanadate according to the procedure outlined by Ryan *et al.*,(1996).Potassium was determined using the flame spectrophotometry method (Black, 1982). N, P and K uptake of grain, straw and biological yield were calculated.

The results were statistically analyzed using M-stat computer package to calculate F ratio according to Snedecor and Cochran (1980). Least significant differences method (L.S.D) was used to differentiate means at the 0.05 level (Waller and Duncan, 1969).

RESULTS AND DISCUSSION

A.1- Some yield attributes

Data tabulated in Table 3 show that the highest significant values of plant height, grain weight /spike, No of grains /spike and 1000 grain weight were obtained by using the 100 % from recommendation dose of mineral fertilizer for wheat (75 kg N, 15 kg P_2O_5 and 24 kg K_2O) in both seasons. Meanwhile, the same trend was observed when the treatment of compost with 75 % from RD was applied in both ones. On the other hand, the lowest significant ones were recorded by soil application of humic acid alone in both seasons. In most cases, 25, 50 % from RD with humic acid gave the same lowest trend in both ones. Grain weight/ spike are an important yield component and made major contribution towards wheat grain yield. The more 1000-grain weight of a crop depicts its efficiency to store more and more photosynthates in the grain. The 1000-grain weight is greatly affected by ecological conditions and soil nutrients. Applying compost along with 75 % from recommended dose of inorganic fertilizers increased significantly yield components of wheat because it increased the availability of nutrients by aerating the soil, increasing soil water holding capacity and lowering down pH of soil which provides the favorable conditions for the growth and ultimately good crop harvest was achieved. These results are in line with those reported by Tahir, *et al.*, (2011) who concluded that organic matter along with recommended dose of mineral fertilizers could be helpful in increasing the wheat grain yield.

Table 3: Some yield components of wheat as affected by compost or humic acid with different rates of inorganic fertilizer

Treatments	Plant height (cm)		Grain weight /spike(g)		No. grain /spike		1000 grain weight(g)	
	S1	S2	S1	S2	S1	S2	S1	S2
R.D%100	94.40	95.00	2.67	2.55	55.43	56.43	43.78	41.85
Compost	88.50	90.00	2.34	2.27	47.60	47.47	41.01	39.52
Compost +75%R.D	93.67	94.07	2.60	2.54	53.23	56.13	42.00	41.76
Compost +50%R.D	92.10	93.40	2.55	2.36	50.93	50.33	41.82	40.66
Compost +25%R.D	91.73	91.40	2.42	2.33	48.77	47.63	41.44	40.55
H.A	85.67	85.93	2.07	1.98	42.93	41.93	38.83	39.26
H.A+75%R.D	88.13	88.90	2.21	2.25	46.30	45.70	40.73	39.49
H.A+50%R.D	87.87	87.93	2.19	2.12	44.47	44.67	40.63	39.40
H.A+25%R.D	87.07	87.00	2.15	2.11	43.67	43.50	39.42	39.30
LSD 0.05	6.30	5.41	0.31	0.20	5.39	4.87	3.58	2.50

RD= Recommendation Dose of NPK fertilizer for wheat HA = Humic aced S= season

A.2- Yield

Generally, the same trend of yield components were observed for grain, straw and biological yield of wheat plant. Results tabulated in Table 4 reveal that the grain, straw and biological yield of wheat plant were increased significantly when 100 % from recommended dose of mineral fertilizer or compost with 75 % from RD were practiced in both seasons. But, the biological yield was affected significantly by adding 100 % from recommended dose in the 1st season only. Vice versa, the same parameters were decreased significantly when soil application of humic acid alone was added. Meanwhile, humic acid with 25 and 50 % from recommended dose gave the same trend of grain yield in the both seasons and biological yield in the 2nd one only. Wheat grain yield per feddan is the outcome of cumulative contribution of various yield components, which is affected by different growing conditions and crop management practices. Applying compost can provide available nutrients for plants and nutrient transformation throughout organic matter decomposition strongly interacts with plant nutrient uptake, leading to a competition for nutrients between soil microorganisms and plants. Same results were obtained by Deksissa *et al.*, (2008) who found that the organic matter in soil improves soil structure, nutrient retention, soil moisture holding capacity and water infiltration. Further, these methods are beneficial for the overall health of the agro-environment (Defra, 2002). Abedi *et al.*, (2010) concluded that the use of chemical fertilizer (N) in combination with compost increased the grain yield significantly.

Table4:Grain, straw and biological yield of wheat as affected by compost or humic acid with different rates of inorganic fertilizer

Treatments	**Grain yield (kg/fed)**		**Straw yield (kg/fed)**		**Biological yield (kg/fed)**	
	S1	**S2**	**S1**	**S2**	**S1**	**S2**
R.D%100	3983	3723	4955	4931	8937	8654
Compost	3249	3214	4269	3913	7518	7128
Compost +75%R.D	3421	3355	4628	4752	8049	8106
Compost +50%R.D	3405	3335	4599	4221	8004	7555
Compost +25%R.D	3402	3326	4594	4164	7996	7491
H.A	2957	2882	3446	3511	6402	6394
H.A+75%R.D	3208	3156	4196	3889	7403	7046
H.A+50%R.D	3082	3097	4179	3828	7261	6925
H.A+25%R.D	3009	3050	4070	3771	7079	6820
LSD 0.05	**562**	**370**	330	181	371	551

B. 1- N, P and K content as well as protein percentage of wheat grain

Data presented in Table 5 illustrate that the treatment of 100 % from recommended dose gave a significant increase of N, P and K content of wheat grain in both seasons. On the other hand, either of 100 % from RD or compost combined with 75 % from RD gave the highest significant value of protein content of wheat grain in both ones. On the contrary, the lowest ones were recorded by adding sole application of humic acid in both seasons. On the other hand, 25 and 50% from RD combined with humic acid gave the same trend of N and P as well as protein content of wheat grain in both one, while, K content was decreased significantly in 2nd one only. The activity of soil microorganisms was higher in the compost management with 75 % from added RD, which helped the nutrient uptake to be faster. Organic manure is commonly added for the soil to hence improve their physical, chemical and biological properties of soils (Celik, *et al.*, 2004). Fliessbach *et al.*, (2000) suggested that, application of organic manure increased the transfer nutrients between the solid phase and soil solution in addition to higher microbial activity. Also, Zeidan *et al.*, (2005), found that farmyard manure application significantly increased the yield and N, P and K uptake of wheat. Abedi *et al.*, (2010) noted that protein composition of the wheat grain is affected by genotype, cultivation system and environmental conditions. In other words, although increased nitrogen levels correlated significantly to an increase in all protein components, its effect on grain protein also depends on the cultivar sown, due to different uses of available soil N, particularly during stem elongation. One important point in our finding was significant increase in content of grain protein by used of organic material in combination with N fertilization. Additionally, positive changes have been showed in the quality of wheat flour, because of raising the amount of gluten after compost treatment (Gopinath *et al.* 2008).

Table 5:Macronutrients content and protein % of wheat grain as affected by compost or humic acid with different rates of inorganic fertilizer

Treatments	Protein % in grain		N (kg/fed)		P (kg/fed)		K (kg/fed)	
	S1	S2	S1	S2	S1	S2	S1	S2
R.D%100	14.78	15.22	102.32	98.55	16.52	15.09	17.93	16.04
Compost	13.36	12.32	71.94	66.81	10.81	10.35	12.58	11.43
Compost +75%R.D	14.61	14.07	86.37	81.36	13.26	12.58	14.82	13.97
Compost +50%R.D	14.09	12.84	78.57	71.90	12.14	11.48	13.57	12.64
Compost +25%R.D	13.40	12.54	72.70	67.30	11.33	11.06	13.10	12.38
H.A	11.77	10.89	68.59	61.24	8.69	8.98	9.23	9.50
H.A+75%R.D	13.07	12.25	70.74	66.24	10.18	10.22	11.77	11.07
H.A+50%R.D	12.52	11.56	69.65	63.64	9.99	10.18	11.23	10.62
H.A+25%R.D	12.21	11.37	68.66	61.82	8.72	9.84	10.89	10.38
LSD 0.05	1.92	1.18	8.41	7.38	0.67	1.04	1.29	1.53

B. 2- N, P and K content of wheat straw

Available data in Table 6 show that the N, P and K content of wheat straw were increased significantly when the treatment of 100 % from recommended dose of mineral fertilizer was applied in both seasons. The same trend was observed for P content of wheat straw in the 1st season and K content in the second one by using the treatment of 75 % from RD with compost. Conversely, the lowest significant values of N, P and K content were recorded when sole humic acid alone or combined with 25 and 50 % from RD were applied in both seasons. Meanwhile, P content was decreased significantly by adding individual application of humic acid in the second season only. Compost enhances the environmental sustainability of agriculture by reducing mineral inputs and increasing soil organic matter. Adding compost to the soil caused remarkable enhancement of different growth parameters and yield as well as N, P and K content of straw yield. In this connection, (Sarwar *et al.* 2007; Sarwar *et al.* 2008) showed that the combination of compost with mineral fertilizer further enhanced the biomass and grain yield of crops. Also, Asghar *et al.* (2006).

Table 6 Macronutrients content of wheat straw as affected by compost or humic acid with different rates of inorganic fertilizer

Treatments	N (kg/fed)		P (kg/fed)		K (kg/fed)	
	S1	**S2**	**S1**	**S2**	**S1**	**S2**
R.D%100	43.27	42.03	4.44	4.25	57.48	66.79
Compost	30.22	27.57	3.13	2.91	40.16	39.95
Compost +75%R.D	37.93	38.31	4.14	3.88	50.83	60.95
Compost +50%R.D	33.12	29.45	3.75	3.36	49.72	41.08
Compost +25%R.D	31.32	28.49	3.32	2.96	41.04	40.66
H.A	20.62	19.64	2.48	2.11	32.29	26.94
H.A+75%R.D	28.01	25.86	2.99	2.58	39.13	39.40
H.A+50%R.D	22.00	21.74	2.76	2.57	34.42	31.96
H.A+25%R.D	21.94	20.27	2.62	2.38	32.60	29.12
LSD 0.05	3.27	2.65	0.398	0.248	4.04	6.34

B. 3- N, P and K content of wheat biological yield

Results in Table 7 reveal that the highest significant values of N, P and K content of wheat biological yield were obtained by 100 % from RD followed by treatment of compost with 75 % from RD in both seasons. On the other hand, the lowest ones were observed by humic acid alone or combined with 25 and 50 % from recommended dose in both ones. While, P content of biological yield was decreased significantly when humic acid alone was applied in the 2^{nd} season only. These results reveal that when adding enriched compost along with chemical fertilizers, compost prevents nutrient losses. Thus, integrated use of chemical fertilizers and compost may improve the effectiveness of mineral fertilizers and reduce their use in order to improve crop productivity as well as sustain soil health and fertility. in addition, the positive effect of organic fertilizer on soil structure that lead to better root development that result in extra nutrient uptake, compost not only slowly releases nutrients but also prevents the losses of mineral fertilizers through denitrification, volatilization and leaching by binding to nutrients and releasing with the passage of time (Arshad *et al.* 2004).

C - Economic Evaluation of wheat under different treatments:

C. 1- Total Cost:

Table (8 a) show the total cost of wheat as affected by compost or humic acid with different rates of inorganic fertilizer, it is clear from the Table that the highest cost estimated is about 5579 LE (the treatment of compost+75% RD). This is due to the high cost of fertilization which is estimated 489LE, representing around 19% of the variable cost in this treatment. On the other hand, the lowest cost estimated is about 4770 LE (HA Treatment).

Table 7 Macronutrients content of wheat biological yield as affected by compost or humic acid with different rates of inorganic fertilizer

Treatments	N uptake /Biological (kg/fed)		P uptake /Biological (kg/fed)		K uptake /Biological (kg/fed)	
	S1	S2	S1	S2	S1	S2
R.D%100	145.59	140.58	20.96	19.34	75.41	82.83
Compost	102.16	94.38	13.94	13.26	52.74	51.38
Compost +75%R.D	124.30	119.67	17.40	16.46	65.65	74.92
Compost +50%R.D	111.69	101.35	15.89	14.84	63.29	53.72
Compost +25%R.D	104.02	95.79	14.65	14.02	54.14	53.04
H.A	89.21	80.88	11.17	11.09	41.52	36.44
H.A+75%R.D	98.75	92.10	13.17	12.80	50.90	50.47
H.A+50%R.D	91.65	85.38	12.75	12.75	45.65	42.58
H.A+25%R.D	90.60	82.09	11.34	12.22	43.49	39.50
LSD 0.05	8.92	7.42	0.92	1.00	4.76	6.07

Table (8 a)Total cost (LE/Fed.) of wheat as affected by Compost or Humic acid with different rates of inorganic fertilizer

Treatments	Variable cost								Field Rent	Total Cost
	plowing	Planting	Irrigation	Compost	Humic	Fertilizer	Weeds	Harvesting		
R.D%100	200	50	180	0	0	633	200	900	3000	5163
Compost	200	50	180	560	0	0	200	900	3000	5090
Compost +75% RD	200	50	180	560	0	489	200	900	3000	**5579**
Compost +50%RD	200	50	180	560	0	342	200	900	3000	5432
Compost+25% RD	200	50	180	560	0	197	200	900	3000	5287
H.A	200	50	180	0	240	0	200	900	3000	4770
H.A+75%R.D	200	50	180	0	240	489	200	900	3000	5259
H.A+50%R.D	200	50	180	0	240	342	200	900	3000	5112
H.A+25%R.D	200	50	180	0	240	197	200	900	3000	4967

Source: Collected and calculated from data of experimental field.

C. 2- Wheat Productivity:

Table (8 b) explains the productivity of both main and secondary crop of wheat under different treatments of compost or humic acid in two seasons of experiment. It is clear that the highest productivity of wheat was estimated about 3.89 ton/fed in the first season, 3.72 ton/fed in the second one, which achieved by applying the first treatment (100% RD).followed by the productivity derived from using compost and 75% of recommended dose (compost+75% RD), which is 3.42, 3.35 ton/fed in the two seasons, respectively.

C. 3- Net return [1]:

By Calculating the net return of wheat / Feddan achieved by using different treatments according the price of wheat (about 2533 LE/Ton), the price of straw is about (260 LE/Ton), it is clear from Table (8 c) that the highest net return is achieved by using the treatment (100% RD), which estimated about 6214 LE in the first season, 5549 LE in the second season.

(1) Net return=(productivity*price)-total cost

Using humic acid alone achieved the lowest net return about 3616 and 3443 LE in the first and second season, respectively.

Table (8 b) Wheat productivity (t/fed.) as affected by Compost or Humic acid with different rates of inorganic fertilizer

Treatments	Wheat		Straw	
	Season 1	Season2	Season 1	Season2
R.D%100	3.983	3.723	4.955	4.931
Compost	3.249	3.214	4.269	3.913
Compost +75%R.D	3.421	3.355	4.628	4.752
Compost +50%R.D	3.405	3.335	4.599	4.221
Compost +25%R.D	3.402	3.326	4.594	4.164
H.A	2.957	2.882	3.446	3.511
H.A+75%R.D	3.208	3.156	4.196	3.889
H.A+50%R.D	3.082	3.097	4.179	3.828
H.A+25%R.D	3.009	3.050	4.070	3.771
LSD 0.05	**562**	**370**	**330**	**181**

Source: collected and calculated from data of experimental field.

Table (8 c) Net return of wheat crop per Feddan as affected by Compost or Humic acid with different rates of inorganic fertilizer

Treatments	**Total return**		**Total cost**	**Net return**	
	Season 1	**Season2**		**Season 1**	**Season2**
R.D%100	11377	10712	5163	6214	5549
Compost	9340	9158	5090	4250	4068
Compost +75% RD	9869	9734	5579	4290	4155
Compost +50%RD	9821	9545	5432	4389	4113
Compost+25% RD	9812	9507	5287	4525	4220
H.A	8386	8213	4770	3616	3443
H.A+75%R.D	9217	9005	5259	3958	3746
H.A+50%R.D	8893	8840	5112	3781	3728
H.A+25%R.D	8680	8706	4967	3713	3739

Source: collected and calculated from data of experimental field.

CONCLUSIONS

The composts prepared will not only supplement the chemical fertilizers but also reduce the environmental pollution. In this strategy, the cost of production is also reduced. Hence, higher yield with resultantly more income is expected for the farming community in this farming system. The fertility and productivity of the soil can be improved on sustainable basis. From the above mention results, we can concluded that the addition of compost with 75 % from recommended dose of NPK fertilizers led to improve the yield and its components as well as chemical composition of grain, straw and biological yield of wheat plant variety Sahka 94, also, protein content in grain, also, it is better from economic point of view.

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التاثير المتبادل للتسميد العضوى والغير عضوى على الانتاجية والتقييم الاقتصادى لقمح الخبز

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اقيمت تجربة حقلية بمزرعة محطة البحوث الزراعية بكفر الحمام بمحافظة الشرقية – مصر خط عرض 30,35 وخط طول 31,30 وارتفاع عن سطح البحر 13 متر . خلال موسمين زراعيين 2011/2010 و 2012/2011 لدراسة تاثير معدلات مختلفة من النيتروجين والفوسفور والبوتاسيوم تمثل (25و 50 و75 % من التوصية السمادية (75 كجم نيتروجين/ فدان و 15 كجم خامس اكسيد الفوسفور/ فدان و 24كجم ثانى اكسيد البوتاسيوم/ فدان) منفردا او مع الكمبوست بمعدل 2 طن للفدان او مع حامض الهيوميك ارضى بمعدل 6 كجم/ فدان على الانتاجية والتحليل الكيماوي والتقييم الاقتصادى لقمح الخبز. وكانت اهم النتائج كما يلى: عموما,فى معظم الاحوال, ادى اضافة الكمبوست مع 75 % من التوصية السمادية المعدنية الى زيادة معنوية فى المحصول ومكوناتة ايضا فى التركيب الكيماوى لقمح الخبز تحت الدراسة0 باضافة التوصية السمادية كاملة منفردة زاد معنويا المحصول ومكوناته ومحتوى الحبوب والقش والمحصول البيولوجى من العناصر الغذائية الكبرى (ن –فو – بو)0 تحسنت النسبة المئوية للبروتين باستخدام التوصية السمادية المعدنية منفردة او باضافة الكمبوست مع 75 % من التوصية السمادية المعدنية0 زاد صافى الربح فى كلا الموسمين باستخدام التوصية السمادية المعدنية منفردة او باضافة الكمبوست مع 75 % من التوصية السمادية المعدنية 0فى حين ادى اضافة حامض الهيوميك منفردا او مع 25 او 50 % من التوصية السمادية لانخفاض معنوى فى كل الصفات تحت الدراسة بما فيها صافى الربح 0

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